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CONTRIBUTIONS TO A REVIEW OF PHILIPPINE
SNAKES, IX
THE SNAKES OF THE GENUS CYCLOCORUS

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THE SNAKES OF THE GENUS *CYCLOCORUS*

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FOUR TEXT FIGURES

The colubrid snakes of the genus *Cyclocorus* Duméril are endemic to the Philippines where they are found on every major island in the archipelago except those of the Palawan chain. And probably they do not occur there. Though superficially resembling the Oriental genera *Tetralepis* and *Psammodynastes*, *Cyclocorus* appears to be without close relatives anywhere in the Oriental region except for another endemic Philippine genus, *Hologerrhum*. The two genera differ in that *Hologerrhum* possesses grooved teeth on the posterior portion of the maxillary bone, *Cyclocorus* does not.

The writer is grateful to Dr. Robert F. Inger, Chicago Natural History Museum (CNHM); Dr. Ernest E. Williams, Museum of Comparative Zoology, Harvard University (CMZ); Dr. Doris M. Cochran, United States National Museum (USNM); Mr. Charles M. Bogert and Dr. Richard Zweifel, American Museum of Natural History (AMNH); Mr. Neil B. Richmond, Carnegie Museum, Pittsburg (CM); and Dr. George S. Myers, Division of Systematic Biology, Stanford University (SU), for permission to examine specimens under their charge.

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TERMINOLOGY

Standard length: distance from tip of snout to anal opening.

* : following locality listed under "Range" indicates specimens were seen from that site.

Scale reduction formula: $15(3 + 4[90 - 100])13$ indicates that dorsal scales reduce from 15 to 13 by fusion of third and fourth rows (on each side) between ventrals 90 and 100.

Genus **CYCLOCORUS** Duméril

Cyclocorus DUMÉRIL (1853) 460 (type species *Lycodon lineatus* Reinhardt, by monotypy).

Cyclochorus JAN (1863b) 98 (erroneous subsequent spelling).

Definition.—maxillary teeth 16 to 21, the anterior three to seven increasing in size posteriorly, the last two very large and fanglike, followed by a short diastema and 12 to 15 small teeth; maxillary bone bent inwards anteriorly; head slightly distinct from neck; eye small, pupil round; body cylindrical; scales in 17 longitudinal rows at midbody, smooth, without apical pits; ventrals rounded; subcaudals unpaired; hypapophyses present throughout dorsal vertebræ; hemipenes elongate, narrow, unforked; sulcus spermaticus unforked.

Remarks.—Three species of this genus have been described. *Cyclochorus maculatus* Jan and *Lycodon lineatus* Reinhardt are strict synonyms.

In 1923, Taylor described *C. nuchalis* from Mindanao. He thought it could be distinguished from *C. lineatus* by a number of distinctive characters including (a) size of the parietal shield and of the eye, (b) number of upper labials and the number which border the orbit, and (c) number of anterior temporal shields and number of ventral shields. Of these, differences in the size of the parietal shield and of the eye were found to fall within the range of variation of typical *C. lineatus*. The number of upper labials, the number of shields bordering the orbit, the number of anterior temporals and the number of ventral plates were, indeed, found to differ. But only recently, and to this writer's mind more significantly, it was discovered that the two nominal species also possess rather distinct hemipenes.

The number of upper labials and the number of those shields which border the orbit represent, in fact, but one character. Reduction from eight to seven labials takes place through fusion or loss of the fourth labial, the shield which is located immediately beneath the eye. It would seem likely that loss of one of the ocular labials would be reflected in a reduction in the size of the eye. This is not the case, however, because the third and fifth labial shields which remain after loss of the fourth shield have the same linear dimensions as the former combination of three shields. Although samples of *C. lineatus* rather consistently have eight upper labials, the

samples of *C. nuchalis* from southern and southwestern Mindanao and Basilan (including the type and paratype) have seven labials, while those from the eastern half of Mindanao, Leyte, and Samar have eight shields.

Mindanao populations of *Cyclocorus* differ from those on Luzon, Negros, and elsewhere in usually having one rather than two temporals, in lacking or having greatly reduced small white spots along the lateral edge of the ventral shields, in having fewer dark blotches on the ventral surface, and in the lower number of ventral shields.

The color pattern of northern populations of *Cyclocorus* consists of a dense blotching of black on the venter and a series of small whitish dots along the lateral edge of each ventral shield. The white spotting is particularly well developed in Luzon and Polillo samples. White dots are also present in specimens from Negros Island, but the dots are very small. The samples from Mindanao-Basilan show some variation; very minute white spots are occasionally present, but more frequently they are absent. When the light spots are present they are never as large as in specimens from the northern islands. The black blotching of the venter among northern populations is usually dense. Again, among specimens from Mindanao there is considerable variation, but in general there are fewer blotches midventrally, the dark spots when present being restricted for the most part to the lateral edges of the ventrals.

With respect to ventral (Figure 1) and subcaudal (Figure 2) counts, it appears that the Negros-Cebu population differs significantly from Luzon, Mindanao, and Mindoro samples in ventral counts, too. The Mindanao samples differ most strikingly in their lower ventral counts, though the subcaudal counts do not significantly differ statistically from those of the Luzon sample. A comparison of the sums of ventral-subcaudal (Figure 3) counts as a reflection of the total number of vertebræ present, on the other hand, appears subject to a north-south clime, the northernmost population of *Cyclocorus* having more shields than the southernmost. What is probably significant from a taxonomic standpoint, however, is that in some populations there are changes in numbers of caudal scutes (and presumably caudal vertebræ), in others of ventral shields (or body vertebræ).

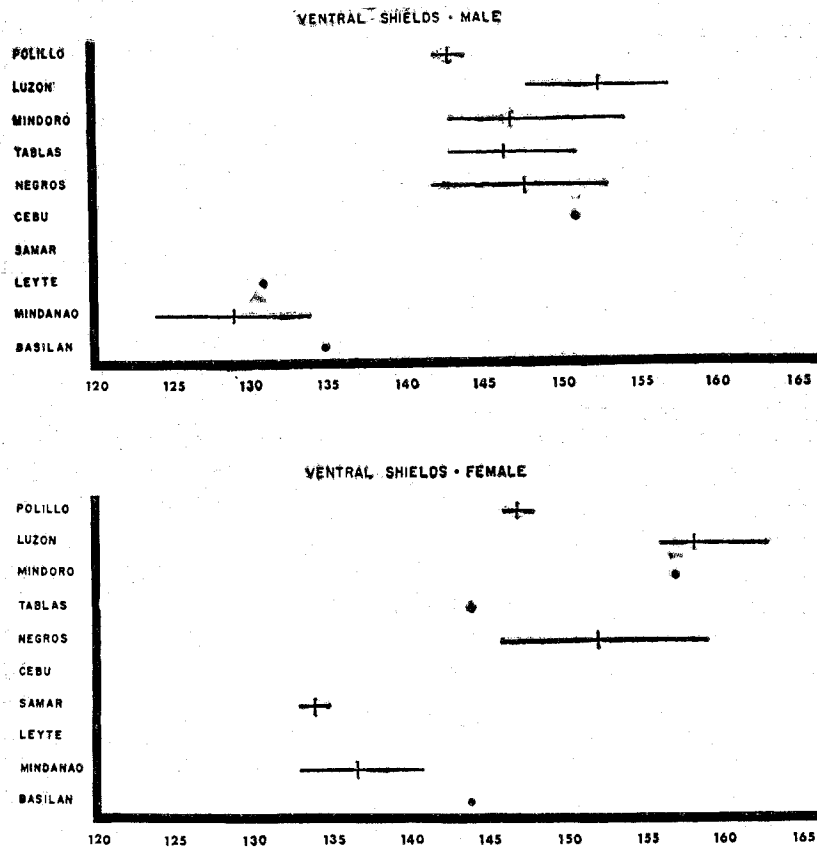


FIG. 1. Summary of ventral counts of samples of *Cyclocorus*. Range of counts is represented by the length of the horizontal bar; the mean by the position of the vertical bar. Counts of single specimens represented by dots.

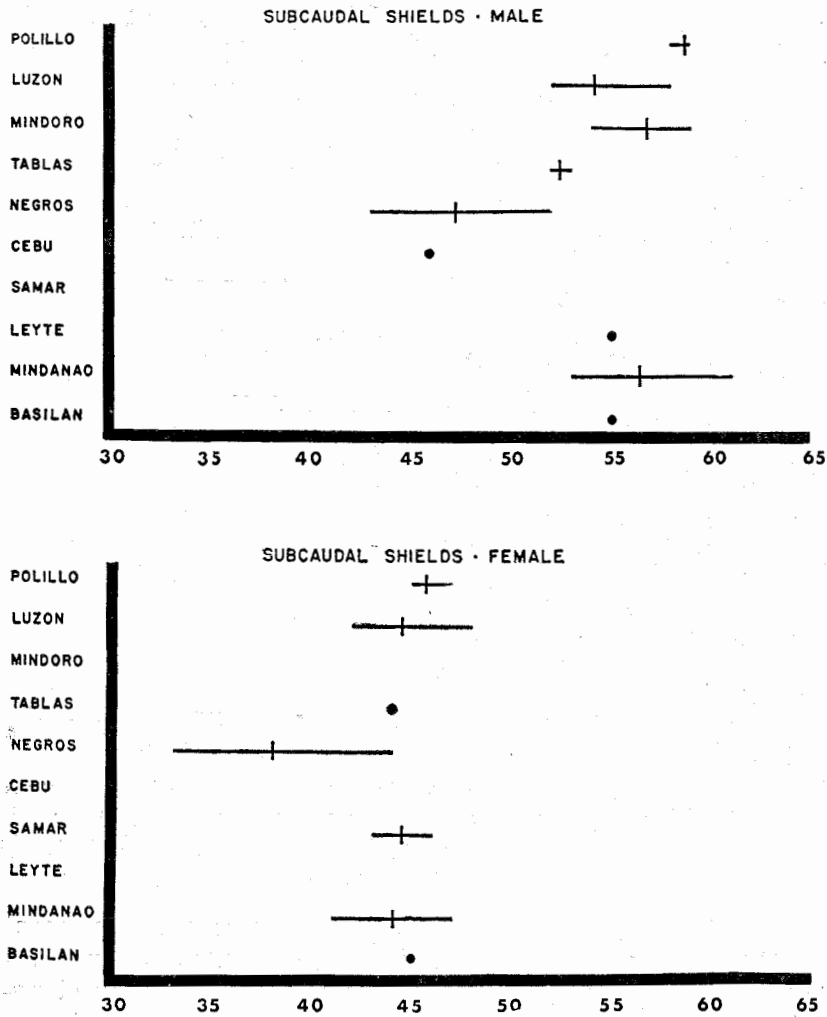


FIG. 2. Summary of subcaudal counts of samples of *Cyclocorus*. Range of counts is represented by the length of the horizontal bar; the mean by the position of the vertical bar. Counts of single specimens represented by dots.

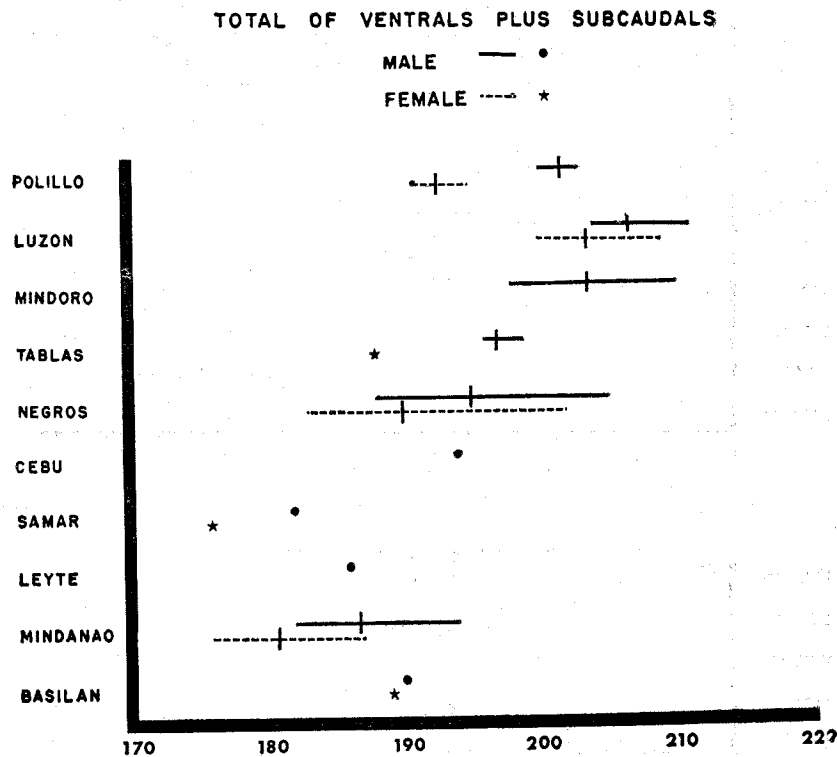


FIG. 3. Comparison of ventral plus subcaudal counts both between sexes and among island samples. Range of counts is represented by the length of the horizontal bar; the mean by the position of the vertical bar; counts of single specimens represented by dots or stars.

Of all the characters examined, the differences in hemipenial structure between the "*nuchalis*" and "*lineatus*" complexes appear most distinctive. *Cyclocorus lineatus* has very elongate and narrow hemipenes, the organ hardly a millimeter in diameter. The walls are beset with very minute spines, scarcely discernible even with the use of low magnification of a dissecting microscope. The hemipenes of *C. nuchalis* are, on the other hand, shorter, stouter and strongly spinose.

While it is true that the northern Mindanao-Samar population of *Cyclocorus* does have a head scale pattern intermediate between *C. lineatus* and typical *C. nuchalis*, the appearance of the hemipenes, ventral counts, and color pattern clearly associates with *C. nuchalis*.

As demonstrated earlier, the Negros-Cebu population of *C. lineatus* appears to represent a distinct subspecies. Similarly, the population of *Cyclocorus* inhabiting eastern Mindanao, Samar, and Leyte can be distinguished from the *forma typica* of western Mindanao-Basilan, previously named by Taylor as *C. nuchalis*, and should be accorded taxonomic recognition as a distinct subspecies.

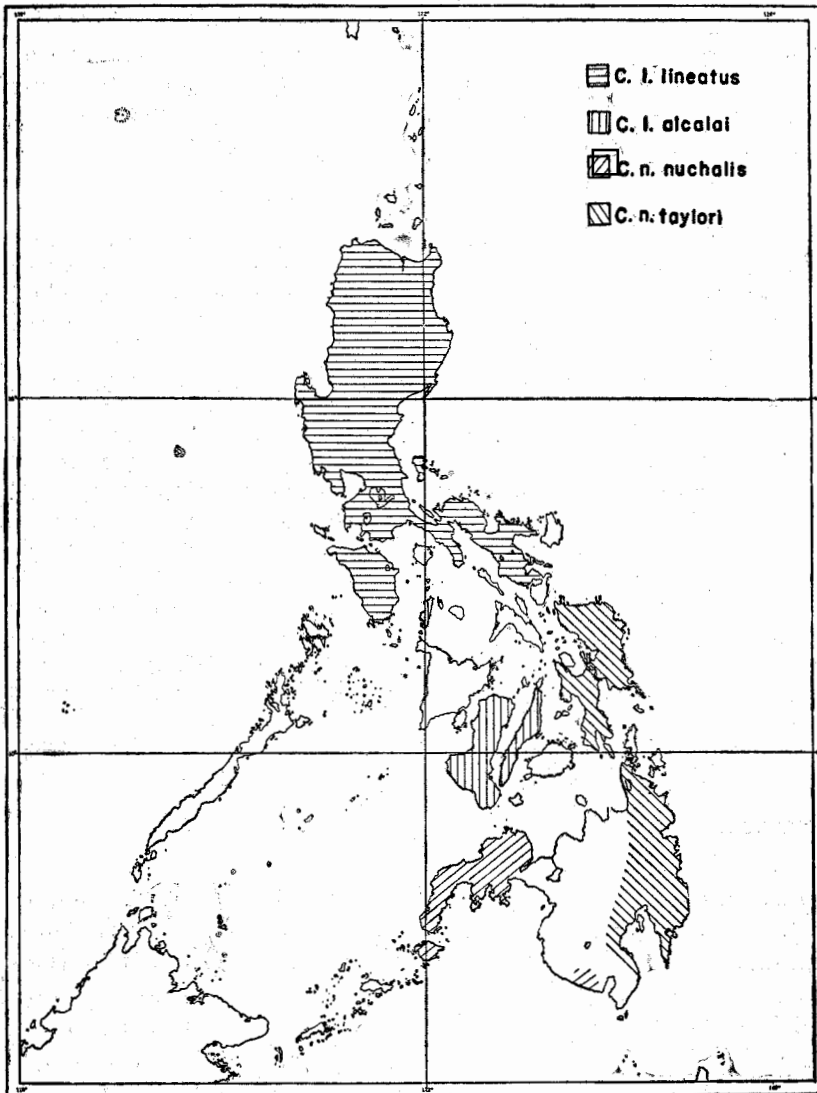


FIG. 4. Distribution of *Cyclocorus* in the Philippines.

In summary (Figure 4), there is justification for recognizing Taylor's *C. nuchalis* as a distinct species. Those populations inhabiting Basilan Island and Zamboanga and Cotabato provinces of Mindanao represent the typical form. From this it follows that central and eastern Mindanao and Samar and Leyte islands are inhabited by populations of *C. lineatus* which may with reasonable cause be referred to a distinct subspecific taxon, to be known as *Cyclocorus lineatus taylori*.

In a like manner the populations of *C. lineatus* inhabiting Negros and Cebu differ consistently in a different suit of characters from the nominal form inhabiting Luzon. It seems justified that these populations be referred to a distinct subspecific taxon, too: *Cyclocorus lineatus alcalai*.

Key to the Philippine species of Cyclocorus

- 1a. Ventral shields more than 137; hemipenes very narrow, elongate with minute spines ornamenting walls; usually 8 upper labials, 3 of which border eye; usually 2 anterior temporals; white spots along lateral edge of ventrals prominent; many dark usually triangularly-shaped blotches on ventral scales.
 - 2a. Tail length/standard length ratio ♂: 0.259 [0.235 to 0.296], ♀: 0.197 [0.152 to 0.223]; subcaudal shields ♂ 42 to 53, ♀ 33 to 44; white spots along lateral edge of ventrals very small *C. l. alcalai*
 - 2b. Tail length/standard length ratio ♂: 0.337 [0.295 to 0.371], ♀: 0.226 [0.196 to 0.262]; subcaudal shields ♂ 52 to 59, ♀ 42 to 48; white spots along lateral edge of ventrals prominent *C. l. lineatus*
- 1b. Ventral shields less than 136; hemipenes robust, inner walls uniformly spinose, spines of moderate size; 7 or 8 upper labials, 2 or 3 of which border eye; usually 1 anterior temporal; white spots along lateral edge of ventrals, if present, obscure; few or no dark triangular blotches on ventral scales.
 - 3a. Usually 8 upper labials, 3 which border eye *C. n. taylori*
 - 3b. Usually 7 upper labials, 2 of which border eye *C. n. nuchalis*

CYCLOCORUS LINEATUS (Reinhardt).

Lycodon lineatus REINHARDT (1843) 241.

Description.—Maxillary teeth 16 to 21, anterior series enlarged; rostral wider than deep; internasals smaller than prefrontals; frontal more than twice as long as wide, less than twice as wide as supraoculars but longer than parietals; nasal shield divided, nostril in larger anterior portion; loreal present, small, in contact with second upper labial; two preoculars, very rarely one, usually in contact with frontal thereby pre-

venting preocular from contacting supraocular; two postoculars; temporals 2 + 2; eight upper labials, third, fourth and fifth upper labials bordering orbit; eight or nine lower labials, three to five shields in contact with anterior chin shields; posterior chin shields about as long as anterior pair; dorsal scales reduce 17(-4 [94-129])15; caudodorsal scales reduce 7(3+4 [vertebral + paravertebral reduction] [4-19]) 5(2+3 [vertebral + paravertebral reduction] [15-42]) 3; ventral and subcaudal counts see Figures 1 and 2; anal pate undivided.

Hemipenes narrow and elongate, extending to 24th subcaudal plate, unforked, sulcus spermaticus unforked; there are numerous very low ridges in which are set very minute spines, but these are not visible except in everted position.

Color (in alcohol) medium to dark brown above with three indistinct darker lines present (a vertebral and two laterals); a series of small white or yellowish spots present along lateral edge of each ventral; below yellowish or white with many dark brown or black blotches, usually triangular in shape.

Measurements of two largest specimens (in mm).—Standard (snout-vent) length, ♂-366, ♀-395; tail length, ♂-120, ♀-89.

Sexual dimorphism.—When island samples and sexes are treated separately, it can be shown that the sexes differ in ventral and subcaudal counts, and in the total of ventral plus subcaudal counts, and in the tail length-standard length ratio. Females average slightly more ventral plates than males except in the small Tablas sample where the average for three males is two shields greater than the count for a single female. Males have distinctly more subcaudals than the females, however, and males have longer tails and shorter bodies (tail length/standard length ratio) than females. These differences between sexes are all too obvious if reference is made to figures 1 and 2, the graphs of ventral and subcaudal counts.

Closely correlated with the dimorphism in ventral and subcaudal counts is dimorphism in the position of reduction of dorsal and caudodorsal scales. Island samples must be treated separately. In the Tablas sample for example the dorsal scales reduce in males 17 (-4 [98-107]) 15, and in females 17 (-4 [110-117]); the caudodorsal scales reduce in males (3 + vertebral [16-19]) 5 (2 + vertebral [40-42]) 3.

Ecological note.—The specimens reported on here were taken at varying altitudes from sea level to 5,000 feet. Most fre-

quently they were taken in forested areas on the ground under logs or in debris piles.

According to Taylor [(1922a) 109] several specimens collected on Mt. Canlaon, Negros Island, were found to contain remains of the burrowing snakes *Pseudorabdion mcnamaræ* or *Calamaria gervaisi* in their stomachs. Among the specimens examined here, only lizard remains were noted in the stomachs. Several *Mabuya* and at least one *Sphenomorphus* were noted. Further, a single egg case was taken from the stomach of one specimen.

Taylor [(1922a) 110] states, "The female lays five or six eggs which are about 2 centimeters long when newly laid. These are placed usually under a log. On one occasion a set of eggs was obtained from the interior of a small ant hill at the base of a tree..." From three to four eggs were found in the oviducts of females examined by me. The largest eggs measured about 23 mm long by 8.5 mm wide. Females of *C. lineatus* from Luzon and Negros containing eggs in the oviducts were collected during the months of December through March, while female *C. nuchalis* taken on Mindanao in October contained oviducal eggs. A single female, *C. nuchalis*, collected in April, was found to have enlarged oviducts, but no eggs were present. Male specimens of *C. nuchalis*, collected during a similar period, were found to have enlarged testicular tissues. From this it may be inferred that the southern *C. nuchalis* breeds earlier than the northern *C. lineatus* and that the time of greatest sexual activity may be associated with the rainy season.

CYCLOCORUS LINEATUS LINEATUS (Reinhardt).

- Lycodon lineatus* REINHARDT (1843) 241, pl. 1, figs. 7-9 (type loc: Manila, Luzon Island; type in Copenhagen; original description).
Cyclocorus lineatus DUMÉRIL (1853) 461 (listed.—Duméril, Bibron, and Duméril (1854) 386 (Luzon Island [Manila¹]; description); MÜLLER (1883) 288 (in part; Luzon Island; listed); BOETTGER (1898) 35 (in part; Luzon Island; listed); GRIFFIN (1910) 211 (Polillo Island; listed), (1911) 258 (in part; Luzon Island [Benguet, Bataan, Laguna, and Tarlac provinces; Manila, Daraga], Polillo Island; listed in key); THOMPSON (1913) 419, 425 (Luzon Island [Olongapo]; scutellation, remarks on internal anatomy, description of hemipenes); TAYLOR (1922a) 106 (in part; Mindoro

¹The authors state that their two specimens were collected in Manila. However, the low subcaudal counts (given as 40 to 44), at least ten shields less than any I have seen from Luzon Island, suggests either the locality data or counts are suspect.

Island [Puerto Galera, Sumagui], Polillo Island; synonymy, description, variation, counts and measurements of material examined, common names), (1922b) 137 (Luzon Island [Mt. Makiling]; habitat), (1923) 545 (Luzon Island [Balbalan, Los Baños]; color pattern, relationships).

Cyclochorus lineatus JAN (1863) 98 (listed).

Cyclochorus maculatus JAN (1870) Livr. 36, pl. 6, fig. 3 (type loc: Manila, Luzon Island; type in Paris Museum; original figure).

Cyclochorus lineatus lineatus LEVITON (1963) 390, 395 (listed from Luzon and Mindoro).

Range.—LUBANG. LUZON: Albay Province (Daraga); Bataan (Ifugao); Kalinga Subprovince (Balbalan *); Laguna Province

(Los Baños *, Mt. Makiling *); Pampanga Province (Mt. Arayat *); Rizal Province (Albany *, Guadalupe *, Manila); Zambales Province (Mt. Calaclan *, Olongapo). MINDORO: Barawanan Peak *, Carayrayan *, Puerto Galera, San José *, Sumagui *. POLILLO: without exact data *.

Material examined (34).—LUZON: Benguet Subprovince: Baguio (MCZ 25675); Kalinga Subprovince: Balbalan (CAS 61548 to 61551); Laguna Province: Los Baños (CAS 61161 to 61162, 62579), Mt. Makiling (CAS 61317); Pampanga Province: Mt. Arayat (CAS 61811); Rizal Province: Albany (USNM 50981), Guadalupe (CAS 61809); Zambales Province: Mt. Calaclan (CAS 15240 to 15241); without exact locality data (CAS 73770). MINDORO: Carayrayan, Mt. Halcon (MCZ 37698), Barawanan Peak, east of Mt. Halcon (SU 17932 to 17933, 18194), San José (AMNH 73418 to 73421), Sumagui (CM 2417 to 2419, 2301); without exact locality data (USNM 36115). POLILLO: without exact locality data (CAS 62432 to 62436, CNHM 15056).

Diagnosis.—Usually two anterior temporals; eight upper labials, three of which border eye; ventrals: ♂ 142 to 157, ♀ 146 to 163; subcaudals: ♂ 52 to 59, ♀ 42 to 48; tail length/standard length ratio: ♂ 0.337 [0.295 to 0.371], ♀ 0.226 [0.196 to 0.262]; white spots present on lateral edge of ventrals; venter with many dark usually triangularly-shaped blotches.

CYCLOCORUS LINEATUS ALCALAI subsp. nov.²

Cyclochorus lineatus GRIFFIN (1911) 258 (in part; Negros Island [Negros Occidental Province]); TAYLOR (1917) 359 (Negros Island

² Named in honor of Dr. Angel C. Alcala of Silliman University, Dumaguete, Negros, Philippines, in recognition of his valuable contributions to Philippine herpetology.

[Mt. Canlaon]; variation), (1922a) 106 (in part; Negros Island [Mt. Canlaon]), (1923) 545 (in part; Negros Island [Negros Occidental Province]).

Cyclocorus lineatus lineatus LEVITON (1963) 384, 398, 407 (listed from Cebu, Negros, and Tablas).

Holotype.—California Academy of Sciences 101587, male, collected on the ridge on the north side of the Maite River, 5 km west of Valencia, by A. Reyes and G. Linguis, December, 1952.

Paratypes (67).—[All from Negros Island.] Negros Occidental Province: Cabagnaan Barrio area (SU 19523 to 19534), Mt. Canlaon (CM 2318 to 2320, 2322 to 2327, 2329 to 2335; MCZ 20089 to 20090). Negros Oriental Province: Bagacy (SU 18186); Banika River valley, about 5 km west of Dumaguete (SU 17934); Bonghong Sitio, Luzuriaga (SU 18884 to 18885); Dumaguete (CAS 62123, SU 13115); Camp Lookout, Cuernos de Negros (CNHM 77648 to 77652); ridge on northeast side of north peak of Cuernos de Negros (SU 18177 to 18178); ridge on north side of Maite River (SU 18179 to 18183, 18185, 18187 to 18190, 18785 to 18787); ridge on south side of Maite River (SU 18771, 18883); Lake Balinsasayao area (CNHM 61615; SU 18469); Pagyabunan (CNHM 61617); Ocoy River valley, 3 km west of Palimpinon (SU 18777).

Additional material examined (6).—CEBU: Antuwanga area, about 7 km west of Cebu City (SU 18193). TABLAS: without exact locality data (MCZ 25670 to 25674).

Diagnosis.—Usually two anterior temporals; eight upper labials, three of which border eye; ventrals: ♂ 142 to 153, ♀ 144 to 159; subcaudals: ♂ 42 to 53, ♀ 33 to 44; tail length/standard length ratio: ♂ 0.259 [0.235 to 0.296], ♀ 0.197 [0.152 to 0.223]; very small white spots present on outer lateral edges of ventrals; venter with dark, triangularly-shaped blotches, especially well developed along lateral edges of ventral shields.

Description of holotype.—♂, possessing characters of species; eight upper labials, third, fourth and fifth bordering eye; one anterior temporal and two posterior temporals; ventrals 148; subcaudals 47; anal plate undivided.

Standard (snout-vent) length 320 mm; tail length 81 mm.

Color pattern as described for species; ventral-lateral white spots present but very small; few dark triangularly-shaped blotches midventrally.

CYCLOCORUS NUCHALIS Taylor.

Cyclocorus nuchalis TAYLOR (1923) 543, pl. 3, figs. 1-2.

Description.—As for *Cyclocorus lineatus* with the following exceptions: upper labials 7 or 8, third and fourth, or third, fourth and fifth bordering eye; usually one anterior temporal; ventral shields less than 145.

White spots along lateral edges of ventrals, if present, very minute; few or no dark triangular blotches on ventral scales.

Hemipenes robust, extending to 14th subcaudal plate (*in situ*), inner walls uniformly spinose throughout, spines of moderate size.

Remarks.—See *C. lineatus* for discussion of sexual dimorphism and ecological notes; comments apply here, too.

CYCLOCORUS NUCHALIS NUCHALIS Taylor.³

Cyclocorus lineatus GRIFFIN (1911) 258 (in part; distribution compiled; listed in key); TAYLOR (1918) 260 (Mindanao Island [near Zamboanga City, in mountains]).

Cyclocorus nuchalis TAYLOR (1923) 543, pl. 3, figs. 1-2 (type loc: Pasananka, Zamboanga, Mindanao Island; type in California Academy of Sciences; original description; color in life).

Cyclocorus lineatus nuchalis LEVITON (1963) 379, 393 (in part; listed from Basilan and Mindanao).

Range.—BASILAN: Abung-Abung*. MINDANAO: Cotabato Province (Saub*); Misamis Occidental Province (Masawan*); Zamboanga Province (Pasananka*).

Material examined (9).—BASILAN: Abung-Abung (MCZ 25676, paratype; USNM 37410). MINDANAO: Cotabato Province: Saub (MCZ 25677-25681); Misamis Occidental Province: Masawan (SU 23446); Zamboanga Province: Pasananka (CAS 62558, holotype).

Diagnosis.—Usually one anterior temporal; usually seven upper labials, two of which border eye; ventrals: ♂ 130 to 135, ♀ 133 to 144; subcaudals: ♂ 53 to 58, ♀ 41 to 45; tail length/standard length ratio: ♂ 0.372 [0.360 to 0.382], ♀ 0.254 [0.231 to 0.288]; white spots if present along lateral edges of ventrals obscure; few or no dark triangular blotches on ventral shields.

³Lack of adequate locality data or counts and measurements of specimens being reported on prevents the assignment of certain literature references to the synonymy of either *C. n. nuchalis* or *C. n. taylori* since both subspecies occur on Mindanao Island. These difficult references include: Fischer, 1885 [*Cyclocorus lineatus maculata*, p. 85] and Müller, 1883 [*Cyclocorus lineatus*, p. 288].

CYCLOCORUS NUCHALIS TAYLORI subsp. nov.*

Hologerrhum philippinum GÜNTHER (1879) 78 (Mindanao Island [Surigao Province: Placer]; listed); BOETTGER (1886) 115 (in part; Mindanao Island [after Günther, 1879]).

Cyclocorus lineatus BOETTGER (1898) 35 (in part; Samar Island; listed); GRIFFIN (1911) 258 (in part; distributional data compiled; listed in key); TAYLOR (1922a) 106 (in part; Mindanao Island [Agusan Province: Bunawan]; variation, counts and measurements of material examined).

Cyclocorus lineatus nuchalis LEVITON (1963) 393, 404 (in part; listed from Mindanao and Samar).

Holotype.—California Academy of Sciences 15242, collected at Butuan, Agusan Province, Mindanao, by Dr. Joseph C. Thompson, October 10, 1907.

Paratypes (16).—MINDANAO: Agusan Province: Bunawan (CM 2289 to 2300); Davao Province: Mt. Apo (CNHM 53365, USNM 34734); Mt. McKinley (CNHM 53364); Madaum (CNHM 53365).

Additional material examined (3).—LEYTE: Bo Patok, Dagami, Mt. Lobi (AMNH 88148). SAMAR: without exact locality data (USNM 53534 to 53535).

Diagnosis.—Usually one anterior temporal; usually eight upper labials, three of which border eye; ventrals; ♂ 124 to 135, ♀ 133 to 141; subcaudals: ♂ 55 to 58, ♀ 43 to 47; tail length/standard length ratio: ♂ 0.388 [0.375 to 0.409], ♀ 0.259 [0.232 to 0.285]; white spots along lateral edges of ventrals small to absent; scattered dark spots, usually not triangular in shape, occasionally present on anterior ventrals, midventral shields on posterior half of body usually unspotted.

Description of holotype.—♂, possessing characters of species; eight upper labials, third, fourth, and fifth border eye; one anterior temporal and two posterior temporals; ventrals 131; subcaudals 58; anal plate divided.

Standard (snout-vent) length 237 mm; tail length 89 mm.

Color pattern as described for species; no ventral-lateral white spots present; median portion of venter immaculate.

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*Named in honor of Dr. Edward Harrison Taylor, who more than forty years ago suggested that this population of *Cyclocorus* probably deserved taxonomic recognition.

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